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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DOLAN, JENNIFER M	
ART UNIT	**PAPER NUMBER**
2813	

DATE MAILED: 01/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/895,478	HARNDEN ET AL.	
	Examiner	Art Unit	
	Jennifer M. Dolan	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 October 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-12* is/are pending in the application.

4a) Of the above claim(s) *8-12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 8/28/02, 10/21/04
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The declarations filed on 10/21/04 and 2/6/04 under 37 CFR 1.131 are sufficient to overcome the Hirumuta et al. (U.S. Patent No. 6,111,312) reference.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 59-161851 to Yoshida in view of U.S. Patent No. 5,616,953 to King et al.

Regarding claim 1, Yoshida discloses a small footprint device package comprising: a plastic package body (4) for enclosing a die (2, 3'), the package including a top, bottom, and sides (see figures 1-5); a diepad supporting the die (page 3, paragraph 3), the diepad having a first side and a second side (top and bottom); a first lead (right side lead 5; figure 5) in electrical and thermal communication with the die (see figure 5), and a second lead (5 on the left side) wirebonded to the die (see figure 5), the first and second leads including an enclosed portion and an exposed portion extending from the side of the package and folding underneath the package bottom to form a first lead foot having a reverse gull wing shape (figure 5b), wherein the angle between the lead on the side of the package and the lead foot is less than 90 degrees (see figure

5; Application Example 4 on pages 4-5), the lead foot being inclined at an angle relative to a planar PC board (8; see figure 5).

Yoshida does not disclose that the die is in contact with a side of the diepad proximate to the lead feet.

King teaches that the die can alternatively be attached on the side of the leadframe opposite to the lead feet (figure 4) or proximate to the lead feet (figure 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the die placement of Yoshida, such that it is attached on the bottom of the diepad, as suggested by King. The rationale is as follows: A person having ordinary skill in the art would have been motivated to place the die on the bottom of the leadframe, because lead-on-chip arrangements are notoriously old and well known in the art. Since King shows that lead-on-chip arrangements (King, figure 5) and arrangements with the die on top of the lead frame, akin to the structure of Yoshida (King, figure 4; Yoshida, figure 5) are substantially equivalent and may be used interchangeably (King, column 3, line 30 – column 4, line 30), it is well within the purview of a person skilled in the art to substitute a lead-on-chip arrangement into Yoshida.

Regarding claim 2, Yoshida discloses that the die is an integrated circuit (Page 2, prior art section) or a discrete device (page 5, Industrial application section).

Regarding claim 4, Yoshida discloses that the package has a reduced profile (figure 5).

Regarding claim 6, Yoshida discloses that the package body further comprises a notch (6b) configured to receive a portion of the first lead foot (figure 5).

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida in view of King et al. as applied to claim 1 above, and further in view of U.S. Patent No. 6,114,759 to Okuaki.

Yoshida discloses a package wherein the lead foot is inclined at a small angle relative to the planar PC board (figure 5), but fails to specify the angle or provide a motivation for inclining the lead foot.

Okuaki discloses a small angle inclination of the lead foot relative to the planar PC board (figures 3 and 5) in order to promote solder wetting and maintain a high bond strength (column 3, lines 12-21). The angle is considered to be about 1-7 degrees (see figures 3 and 5), but Okuaki is silent as to the exact angle.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify in Yoshida as modified by King an angle of inclination between the lead foot and the PC board of 1 – 7 degrees. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to incline the lead foot at an angle between 1 and 7 degrees relative to the PC board, because slightly bending the free end of an outer lead away from the PC board promotes solder wetting (Okuaki, column 3, lines 12-21), but bending the free end at a large angle decreases the contact area between the leads and the PC board, which can decrease the bond strength and cause an increase in the total package height. It is well within the purview of a person having ordinary skill in the art to select an angle between 1 and 7 degrees to optimize the solder wetting, bond strength, and package height. Although Okuaki fails to specify the exact angle of inclination of the lead foot, it has been held that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the

optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (1955).

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida et al. in view of King et al. as applied to claim 6 above, and further in view of U.S. Patent No. 6,433,418 to Fujisawa et al.

Yoshida fails to disclose that the notch includes a depth of about two thirds of the thickness of the lead.

Fujisawa discloses a notch (28a) that includes a depth of about two-thirds of the thickness of the lead (figures 8 and 9). Fujisawa is, however, silent as to the exact depth of the notch.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the notch of Yoshida as modified by King, so that the depth is about two-thirds of the thickness of the lead, as suggested by Fujisawa. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide a notch with a depth as specified, so that the device can be easily stacked, yet maintain a small profile (Fujisawa, figures 12 and 13). Additionally, the notch depth should be selected to provide the advantages of preventing damage to the leads during assembly or mounting, in the form of short circuiting or deformation (Fujisawa, column 8, line 64 – column 9, line 17), while preventing the lead from retracting entirely into the protective notch during assembly. Although Fujisawa fails to specify the exact depth of the notch, it has been held that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or

workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (1955).

Response to Arguments

6. Applicant's arguments with respect to claims 1, 2, and 4-7 have been considered but are moot in view of the new grounds of rejection.

Insofar as the arguments can be applied to the present rejections, the arguments are not persuasive. The applicant argues that the Yoshida package could not feasibly have an "inverted" structure, since the presence of the groove risks failing to provide sufficient plastic material to adequately encapsulate the bond wires. The prior art, however, shows that the bond wires do not necessarily require a huge amount of plastic encapsulant for protection (see, for example, U.S. Patent No. 6,002,167 to Hatano et al. or U.S. Patent No. 6,433,418 to Fujisawa et al.), but rather the wirebonds can be contained in a relatively small area. It would be considered a matter of ordinary skill in the art to optimize the thickness for the encapsulant such that the height of the package is reduced, but the wire bonds are adequately protected.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan
Examiner
Art Unit 2813

jmd

Craig A. Thompson

CRAIG A. THOMPSON
PRIMARY EXAMINER